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Influence of High School Vocational Agriculture on the Matriculation, Graduation, and Employment of Agricultural Engineering Graduates from the Iowa State University of Science and Technology.

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To determine the influence of high school vocational agriculture on college achievement and subsequent employment of agricultural engineering majors, data were collected from 419 graduates of Iowa State University representing the period from 1942 to 1964. The 112 graduates who had taken at least 3 or more semesters of high school vocational agriculture were compared with 112 graduates who had no vocational agriculture. A higher percentage of the vocational agriculture group: (1) had lived on farms, (2) had listed "own idea" as the reason for college attendance, (3) had learned of the agricultural engineering profession earlier, (4) earned a higher percentage of their college expenses, (5) took their first job in Iowa, (6) were involved in supervision, administration, and management in their 1964 employment, and (7) reported income advancing more rapidly. The study indicated that vocational agriculture can be a real asset to agricultural engineers in their later employment and in further preparing them to meet the challenges of the agricultural engineering field. This is an abstract of a thesis submitted to the Iowa State University of Science and Technology. (DM)

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INFLUENCE OF HIGH SCHOOL VOCATIONAL AGRICULTURE ON THE MATRICULATION, GRADUATION, AND EMPLOYMENT OF AGRICULTURAL ENGINEERING GRADUATES FROM THE IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY

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Donald Louis Ahrens

Purpose

It was the purpose of this study to determine the influence of high school vocational agriculture on the matriculation, graduation and employment of agricultural engineering graduates from Iowa State University of Science and Technology.

Method of Procedure

The data for this investigation were collected from 419 graduates who were graduated in agricultural engineering during the period 1942-1964. In order to make comparisons, the groups were divided according to whether they had or had not enrolled in vocational agriculture while attending high school. One hundred and twelve graduates who had taken at least three or more (most completed from six to eight) semesters of high school vocational agriculture were compared with 112 graduates who had not enrolled in vocational agriculture.

Findings

Ninety-five percent of those graduates who had enrolled in vocational agriculture and 78 percent of those graduates who had not enrolled in vocational agriculture while attending high school had lived on farms between their 10th and 17th birthdays. It was further observed that 91 percent of the graduates who had enrolled in vocational agriculture and 79 percent of the graduates who had not enrolled in such training in high school had parents who were farmers.

Major sources of finances reported by those graduates who had enrolled in vocational agriculture while attending high school used to support their college education were: G. I. bill, 34 percent; parents, 31 percent; and other personal finances, 17 percent. In contrast, graduates who had not enrolled in vocational agriculture while attending high school indicated that G. I. bill, 31 percent; parents, 38 percent; and other personal finances, 11 percent had been their major sources of college finances.

More of the fathers than mothers of each group had less than a high school education. Also, more of the fathers (63 percent) and mothers (37 percent) of the graduates who had enrolled in vocational agriculture than fathers (52 percent) and mothers (29 percent) of those graduates who had not enrolled in vocational agriculture had less than a high school education.

High schools with enrollments of less than 100 pupils were attended by 15 percent of the vocational agriculture and 37 percent of the non-vocational agriculture graduates, whereas those with less than 300 pupils were attended by 72 percent of the vocational agriculture and 78 percent of the nonvocational agriculture graduates. All of the graduates who had enrolled in the electric power and processing option while attending college in each group of graduates studies had graduated from high schools with enrollments of less than 300 students.

More of those students who had enrolled in vocational agriculture (28 percent) than graduates who had not enrolled in vocational agriculture (16 percent) listed "own idea" as the factor most influencing their decision to attend college. Thirty-one percent of the graduates who had enrolled in vocational agriculture reported that their parents had most influenced their decision to attend college, whereas 47 percent of those

graduates who had not enrolled in vocational agriculture reported that their parents had most influenced their decision to attend college. Twelve percent of the vocational agriculture graduates were influenced by the high school vocational agriculture teacher. These findings are presented in Table 1.

The vocational agriculture graduates learned of the agricultural engineering profession earlier as evidenced by the fact that 47 percent of these graduates learned of the curriculum in high school compared to 33 percent of the nonvocational agriculture graduates. Seventy-two percent of the vocational agriculture graduates and only 53 percent of the nonvocational agriculture graduates had been informed of the profession between the 9th grade and initial college enrollment. These findings are presented in Table 2.

In Table 3 it is revealed that 89 percent of the graduates who had enrolled in vocational agriculture and 93 percent of the graduates who had not enrolled in vocational agriculture initially enrolled in the College of Engineering. However, 65 percent of the vocational agriculture graduates compared to 55 percent of the nonvocational agriculture graduates originally chose the agricultural engineering curriculum. The largest percentage of the graduates who transferred into agricultural engineering did so because they wanted to better utilize their past work experience.

Five percent of the vocational agriculture graduates earned none of their college expenses and 35 percent earned 76 to 100 percent of their expenses, whereas the percentages for the nonvocational agriculture graduates were 13 percent and 29 percent respectively for zero percent expenses earned and 76 to 100 percent earned.

Table 1. Person or factor responsible for college attendance by curriculum option and vocational agriculture background.

	Option[a]						
	FS	P + M	EPP	S + W	None	Total	
	N	N	N	N	N	N	%
Vocational Agriculture Graduates							
Father	2	12	-	4	1	19	17.0
Mother	4	9	-	3	-	16	14.3
Vocational agriculture instructor	1	10	-	2	-	13	11.6
High school principal or superintendent	-	1	-	1	-	3	2.7
High school counselor	-	1	-	1	-	2	1.8
County extension director	-	-	-	-	-	-	---
Friend in college	-	3	-	-	-	3	2.7
Own idea	7	14	1	6	3	31	27.6
GI bill	-	5	1	7	-	13	11.6
Wife	-	1	-	-	-	1	0.9
High school career day	1	-	-	-	-	1	0.9
Other	1	5	-	3	1	10	8.9
Total	16	61	2	28	5	112	100.0
Nonvocational Agriculture Graduates							
Father	1	22	-	9	1	33	29.4
Mother	5	9	2	4	-	20	17.8
Vocational agriculture instructor	-	-	-	1	-	1	0.9
High school principal or superintendent	-	2	-	1	-	3	2.7
High school counselor	-	-	-	1	-	1	0.9
County extension director	-	-	-	-	-	-	---
Friend in college	2	2	-	-	-	4	3.6
Own idea	-	9	2	7	-	18	16.1
GI bill	-	14	-	2	-	16	14.3
Wife	-	-	-	1	-	1	0.9
High school career day	-	-	-	1	-	1	0.9
Other	1	10	-	3	-	14	12.5
Total	9	68	4	30	1	112	100.0

[a]Option abbreviations represent the following: FS = farm structures, P + M = power and machinery, EPP = electric power and processing, S + W = soil and water, None = no option specified.

Table 2. Period when graduates became aware of agricultural engineering as a profession as related to curriculum option and vocational agriculture background.

Period	Option[a] FS	P + M	EPP	S + W	None	Total	
	N	N	N	N	N	N	%
Vocational Agriculture Graduates							
Before entering 9th grade	-	2	-	-	-	2	1.8
Ninth to twelfth grade	-	31	-	10	3	53	47.3
Between twelfth grade and initial college enrollment	4	15	1	7	1	28	25.0
College freshman	3	11	-	7	1	22	19.6
College sophomore	-	1	1	1	-	3	2.7
Other	-	1	-	3	-	4	3.6
Total	16	61	2	28	5	112	100.0
Nonvocational Agriculture Graduates							
Before entering 9th grade	-	5	-	1	-	6	5.4
Nintn to twelfth grade	2	25	-	9	1	37	33.0
Between twelfth grade and initial college enrollment	2	11	1	8	-	22	19.7
College freshman	3	16	2	8	-	29	25.9
College sophomore	-	7	-	3	-	9	8.0
Other	2	4	1	2	-	9	8.0
Total	9	68	4	30	1	112	100.0

[a]Option abbreviations represent the following: FS = farm structures, P + M = power and machinery, EPP = electric power and processing, S + W = soil and water, None = no option specified.

Table 3. Initial college selected at Iowa State University by curriculum option and vocational agriculture background.

College	Option[a] FS	P + M	EPP	S + W	None	Total	
	N	N	N	N	N	N	%
Vocational Agriculture Graduates							
Agricultural Engineering	14	41	1	17	-	73	65.2
Engineering	1	15	-	8	3	27	24.1
Agriculture	1	5	1	3	1	11	9.8
Science	-	-	-	-	1	1	0.9
Veterinary medicine	-	-	-	-	-	-	---
Total	16	61	2	28	5	112	100.0
Nonvocational Agriculture Graduates							
Agricultural Engineering	5	36	-	19	1	61	54.5
Engineering	3	26	3	11	-	43	38.4
Agriculture	-	6	1	-	-	7	6.2
Science	-	-	-	-	-	-	---
Veterinary medicine	1	-	-	-	-	1	0.9
Total	9	68	4	30	1	112	100.0

[a]Options abbreviations represent the following: FS = farm structures, P + M = power and machinery, EPP = electric power and processing, S + W = soil and water, None = no option specified.

Twenty-two percent of the vocational agriculture and 21 percent of the nonvocational agriculture graduates held memberships in social fraternities. Thirty-two and 33 percent respectively of the vocational agriculture and nonvocational agriculture graduates belonged to one or more honorary fraternities or societies. As for membership in student branch ASAE, three percent of the vocational agriculture and two percent of the nonvocational agriculture graduates failed to join the organization.

When observing the coefficient of correlation between semesters of high school vocational agriculture and semesters of other high school subjects and quality point averages, no significant relationships were found. Final cumulative college quality point averages were found to be highly correlated for each group, significant at the one percent level, with high school quality point average, first quarter college quality point average, and third quarter college cumulative quality point average.

Of the graduates who had originated from Iowa, 53 percent of those graduates who had enrolled in vocational agriculture and 49 percent of those graduates who had not enrolled in vocational agriculture took their first job in Iowa and 38 percent of the vocational agriculture graduates and 45 percent of the nonvocational agriculture graduates were still in Iowa in 1964.

In comparing the percentages of graduates first employed in their respective option areas with their 1964 employment, the percentages employed in each option had decreased for both groups as is revealed in Table 4. The largest percentage of each group found their first employment in the farm equipment industries and essentially the same percentage were still employed in this area in 1964.

On first employment, 50 percent of the vocational agriculture and 46 percent of the nonvocational agriculture graduates classified their job

Table 4. 1964 employment option areas as related to first employment option area and vocational agriculture background.

Option area, 1964	Option area of first employment								Total	
	FS	P + M	EPP	S + W	None	Combi-nation	Military service	Graduate school		
	N	N	N	N	N	N	N	N	N	%
Vocational Agriculture Graduates										
Farm structures	2	-	-	-	-	-	-	-	2	1.8
Power and machinery	1	39	-	-	5	-	-	-	45	40.2
Electric power and processing	-	-	4	-	-	-	-	-	4	3.6
Soil and water	-	-	1	19	2	1	-	-	23	20.5
None of these	-	7	-	2	10	-	-	-	19	17.0
Combination	-	-	-	2	1	2	-	-	5	4.5
Military service	-	-	-	-	1	-	7	-	8	7.1
Graduate school	-	1	-	-	-	-	1	4	6	5.3
Total	3	47	5	23	19	3	8	4	112	100.0
Nonvocational Agriculture Graduates										
Farm structures	1	-	1	-	2	-	-	-	4	3.6
Power and machinery	2	43	1	2	1	-	-	-	49	43.7
Electric power and processing	-	-	2	1	-	-	-	-	3	2.7
Soil and water	-	-	-	11	-	-	-	-	11	9.8
None of these	1	4	1	2	25	-	-	-	23	29.4
Combination	1	2	-	-	1	1	-	-	5	4.5
Military service	-	2	-	-	-	-	-	-	2	1.8
Graduate school	-	1	-	-	-	-	-	4	5	4.5
Total	5	52	5	16	29	1	-	4	112	100.0

as testing and/or designing, whereas only 3 percent and 2 percent of the vocational agriculture and 5 percent and 6 percent of the nonvocational graduates respectively were in administration and/or testing and supervision as is revealed in Table 5. However, in 1964 the percentage in design and/or testing had declined to 34 percent of the vocational agriculture and 37 percent of the nonvocational agriculture graduates, whereas the percentage in administration and/or management and supervision had increased.

For the 1947 to 1952 nonvocational agriculture graduates, the first employment income was one of the best predictors of the 1964 employment income, whereas years since graduation was for the 1952 to 1957 graduates. The activity participation and years of membership in ASAE student branch were the best predictors of the 1964 income for the 1952-1957 graduates. For the graduates of each group during the 1957-1962 period, the first employment income was the best single predictor of the 1964 employment income.

The 1942-1947 graduates of each group had a median first employment income of $3499, whereas the 1952-1957 vocational agricultural and nonvocational agriculture graduates had median incomes of $4999 and $4899 respectively and the 1962-1964 graduates of both groups had median first employment incomes of $6749 and $7249 respectively. The 1942-1947 graduates had in 1964, median incomes of $11,999 (vocational agriculture graduates) and $12,299 (nonvocational agriculture graduates), 1952-1957 graduates had median incomes of $9249 (vocational agriculture graduates) and $7280 (nonvocational agriculture graduates) and the 1962-1964 graduates had median incomes of $7249 and $7599 respectively.

The vocational agriculture graduates in farm structures and the nonvocational agriculture graduates in electric power and processing had the highest median first employment incomes. The vocational agriculture

Table 5. 1964 employment areas by present option area and vocational agriculture background.

Employment area	Option area								Total	
	FS	P + M	EPP	S + W	None	Combination	Military service	Graduate school		
	N	N	N	N	N	N	N	N	N	%
Vocational Agriculture Graduates										
Design and/or testing	2	30	2	16	5	1	-	-	56	50.0
Administration and/or management	-	-	-	1	2	-	-	-	3	2.7
Research and/or development	-	8	-	1	2	-	-	-	11	9.8
Sales and/or service	-	5	2	1	3	1	-	-	12	10.7
Supervision	-	-	-	-	2	-	-	-	2	1.8
Teaching and/or extension	-	-	1	3	-	1	-	-	5	4.5
None of these	1	4	-	1	5	-	-	-	11	9.8
Military service	-	-	-	-	-	-	7	-	7	6.2
Graduate school	-	-	-	-	-	-	1	4	5	4.5
Total	3	47	5	23	19	3	8	4	112	100.0
Nonvocational Agriculture Graduates										
Design and/or testing	1	35	-	9	5	1	-	-	51	45.5
Administration and/or management	1	2	-	-	2	-	-	-	5	4.5
Research and/or development	-	6	2	1	-	-	-	-	9	8.0
Sales and/or service	2	5	2	-	3	-	-	-	12	10.7
Supervision	1	-	-	1	5	-	-	-	7	6.2
Teaching and/or extension	-	2	1	1	1	-	-	-	5	4.5
None of these	-	2	-	4	13	-	-	-	19	17.0
Military service	-	-	-	-	-	-	-	-	-	----
Graduate school	-	-	-	-	-	-	-	4	4	3.6
Total	5	52	5	16	29	1	0	4	112	100.0

graduates in farm structures and combination groups shared the highest median salary ($5,499) in 1962, whereas the nonvocational agriculture graduates in farm structures were high ($7,499) for that group. When a comparison was made in Table 6 of the vocational agriculture and nonvocational agriculture graduates' incomes stratified by option areas at the various points, the vocational agriculture graduates were higher than the nonvocational agriculture graduates at more points in 1964 than they were at the first income points.

When the vocational agriculture and nonvocational agriculture graduates were compared in Table 7 by area of employment instead of option area the above was also found to be true. In 1964 those vocational agriculture graduates in industry related to agriculture and self-employed in engineering, and the nonvocational agriculture graduates in industry not related to agriculture received the highest median incomes.

The vocational agriculture graduates in design and/or testing received the highest median ($5356) first income, as compared to the high ($6165) nonvocational agriculture graduates who were employed in the sales and/or service area. However, in 1964 a larger percentage of both groups were employed in administration and/or management and supervision. The vocational agriculture graduates in administration and/or management received the highest median income ($12,499), whereas the nonvocational agriculture graduates in supervision received the highest median income ($9999) for that group.

ASAE membership in 1964 was reported by 66 percent of the vocational agriculture graduates and 63 percent of the nonvocational agriculture graduates. Six percent of the vocational agriculture graduates were licensed professional engineers compared to 17 percent of the nonvocational graduates.

Table 6. 1964 employment incomes by present option area, and vocational agriculture background.

Income distribution point	Option area[a]					
	FS	P + M	EPP	S + W	None	Combination
Vocational Agriculture Graduates	(n=2)	(n=45)	(n=4)	(n=22)	(n=19)	(n=5)
Ninth decile	$10799	$12499	$8799	$11449	$11099	$14999
Third quartile	10499	10949	6999	8899	10311	13499
Median	9999	8915	6499	7832	8499	9999
First quartile	9499	7177	5999	6832	7349	7749
First decile	9199	6213	5399	5765	5949	7249
Nonvocational Agriculture Graduates	(n=4)	(n=49)	(n=3)	(n=11)	(n=33)	(n=5)
Ninth decile	$11799	$11699	$10339	$ 9449	$12424	$10499
Third quartile	9999	10249	9499	8749	10915	7831
Median	8999	8562	7749	7749	8374	6999
First quartile	6999	7353	7374	6374	6530	6165
First decile	6399	6379	7149	5549	5065	5499

[a]Option abbreviations represent the following: FS = farm structures, P + M = power and machinery, EPP = electric power and processing, S + W = soil and water, None = no option specified, Combination = combination of several of the previously described options.

Table 7. 1964 employment incomes by area of employment and vocational agriculture background.

Employment area	Income distribution point: Ninth decile	Third quartile	Median	First quartile	First decile	Total N	Total %
Vocational Agriculture Graduates							
Education and extension	$11899	$11249	$ 8999	$ 7540	$ 7216	13	13.3
Farm equipment industry	11919	10832	8999	7561	6699	34	34.7
Farm structures industry	--	--	--	--	--	--	--
Soil and water related occupations	10399	8799	7999	6999	5799	16	16.3
Electric power and processing	6899	6749	6499	6249	6099	2	2.0
Industry related to agriculture	12999	11499	9999	7499	5999	10	10.2
Industry not related to agriculture	11299	9374	7832	6415	5565	17	17.4
Self-employed engineer	10899	10749	10449	10249	10099	2	2.0
Farming	11799	7999	3999	3499	3199	4	4.1
Total						98	100.0
Nonvocational Agriculture Graduates							
Education and extension	$10999	$ 9499	$ 8499	$ 6999	$ 6399	8	7.6
Farm equipment industry	11499	10165	8199	7399	6999	40	38.1
Farm structures industry	12249	11124	9499	7499	6499	5	4.8
Soil and water related occupations	9632	9082	7499	5916	5365	11	10.5
Electric power and processing	6899	6749	6499	5749	5299	3	2.9
Industry related to agriculture	12999	11499	9999	7499	5999	13	12.4
Industry not related to agriculture	12649	10374	9749	7624	6349	17	16.2
Self-employed engineer	8899	8749	8499	8249	8099	1	0.9
Farming	10799	8349	6749	4999	1699	7	6.7
Total						105	100.0

A larger percentage of the nonvocational agriculture graduates than vocational agriculture graduates recommended increased emphasis be given to the agricultural courses, although not a large percentage of either group indicated that an increased emphasis was necessary.

Vocational agriculture influenced the graduates in a number of ways as has been pointed out in this discussion. The vocational agriculture graduates tended to be of more rural origin. They had a greater tendency to (1) learn of the agricultural engineering curriculum earlier in life, (2) to decide on their own to attend college, (3) to enter the agricultural engineering curriculum, (4) to earn their own college expenses and (5) to earn a larger percentage of their college expenses.

Vocational agriculture had an influence on the graduates before they entered college, but did not have an appreciable effect on the achievements of the graduates while in college. This may have been due to the fact that agricultural engineering is more "engineering" orientated than "agricultural."

Vocational agriculture, however, did have considerable influence on the employment of the vocational agriculture graduates after they left the university. A higher percentage of them than of the nonvocational agriculture graduates accepted first employment in Iowa, but left the state for better positions as shown by 1964 employment data. Also, a higher percentage of them had moved into administration and/or management and supervision occupations when comparing first and 1964 employment. Finally, when a comparison was made of the vocational agriculture graduates and the nonvocational agriculture graduates' incomes stratified by option and employment areas at the various points, the vocational agriculture graduates were higher than the nonvocational agriculture graduates at more points in 1964 than they were at the first income points.

In conclusion, this study indicated that vocational agriculture can be a real asset to agricultural engineers in their later employment and in further preparing them to meet the challenges of the agricultural engineering field.